An overview of passive and active drag reduction methods for bluff body of road vehicles

ABSTRACT

This paper is an overview of results done on bluff body road vehicle's base drag reduction either by experimental or numerical methods. Two categories of devices are divided that prove certain degrees of effectiveness in reducing the base drag, namely passive and active. The reduction of drag coefficient achieved in existing research ranging from 5% to 50%, which varies for each method and device. However, the higher the achieved drag reduction is, the greater the compensation required is. The compensation comes in various forms to achieve the desirable drag reduction. For passive drag reduction, hump shaped bluff body with boat-tail shows significant drag reduction by 50.9% compared to the other methods. Meanwhile, one of the potential of active drag reductions is by utilizing rotating cylinder. The rotating can reduce the drag on the bluff body by influencing the separation of boundary layer. The drag can be further reduced by enhancing the rotating cylinder with surface roughness and rotation speed. A notable 23% reduction of drag coefficient using rough surface on bluff body vehicle's is achieved compared to the smooth surface.

Keyword: Base drag reduction; Bluff body vehicle; Rotating cylinder